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ORIGINAL ARTICLE

Stress and burnout in chiropractic students of European chiropractic colleges: *A cross-sectional study*

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Objective: High levels of stress and burnout are known to negatively impact academic success, quality of life, and well-being of students. The purpose of this study was to investigate the degrees of stress and burnout levels of students from several European chiropractic colleges.

Methods: Stress and burnout were assessed using the Perceived Stress Scale (PSS-10) and the Maslach Burnout Inventory–Student Survey (MBI-SS). Surveys were delivered electronically in November 2017 to chiropractic students from 4 different chiropractic colleges. Data were analyzed using *t* test and 1-way ANOVA to determine differences between demographic data. Scores in perceived stress and burnout subscales were compared to the general, chiropractic, and medical student populations.

Results: Both the MBI-SS and PSS had similar response rates (30%–34%) and demonstrated statistically significant differences between institutions, with C-3 demonstrating the highest levels of exhaustion ($p < .001$) and the highest levels of perceived stress ($p = .012$). MBI-SS results show that in the general chiropractic student population, 26.4% presented high emotional exhaustion, 18.2% high cynicism, and 43.8% low academic efficacy. Meanwhile, the PSS score indicated "moderate" levels of stress.

Conclusions: European chiropractic students experience higher levels of perceived stress than the general population and they may suffer levels of burnout similar to those of medical students. These results suggest that colleges should monitor stress and burnout levels in their students. This may help to establish student support systems in order to improve students' quality of life and academic performance, as well as help new graduates transition to their professional lives.

Key Indexing Terms: Competency-Based Education; Chiropractic; Professional Burnout; Psychological Stress; Health Occupations Students

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INTRODUCTION

High levels of stress and burnout are known to have a negative impact on academic success, quality of life, and psychological and physical well-being. Over the last years there has been a growing interest in stress and burnout due to an increase in the incidences of stress and associated illnesses such as depression and anxiety.[1–3] According to recent reports, there has been a 30% to 50% increase in mental health issues among college students in the last decade.[4,5] Specifically, many studies have reported high levels of stress and burnout in students enrolled in health science studies such as medicine, dentistry, pharmacy, and physiotherapy programs.[1]

Stress and burnout in the context of professional health education are of paramount importance as the students in these programs will become the future providers of health care.[6] It is important for institutions to teach students how to cope with high levels of stress and burnout, otherwise these issues may have a negative impact on the student's health, interfering in the development of qualities sought after in a health care professional.[2,6] Studies on the prevalence of stress and burnout in medical students demonstrate high levels of depression and anxiety, with levels of psychological distress well over those found in the general population.[7] From these studies, it has been postulated that burnout could have its origins in medical school due to a multitude of factors such as academic pressure and workload, financial concerns, and sleep deprivation.[6,7]

Literature on complementary and alternative medicine education is scarce; however, some studies have shown that chiropractic programs are demanding and have a considerable impact on the psychological and physical well-being

of chiropractic students in comparison to the general student population.[3,6,8,9] In particular, objective clinical structured examinations seem to play an important role in levels of high stress and test anxiety, negatively impacting students' performance.[2,10] In fact, levels of stress and burnout experienced by chiropractic students are similar to those experienced by students from other health sciences, such as medicine, nursing, dentistry, pharmacy, occupational therapy, and physical therapy.[2,6,8,9] Hence, it is appropriate to suggest that chiropractic students may be suffering considerable amounts of stress and burnout, similar to those of medical students.

The levels of stress and burnout in chiropractic education remains largely unexplored, and as such, the primary objective of this study was to quantify the prevalence of stress and burnout in chiropractic students from European chiropractic colleges by using the Perceived Stress Scale (PSS-10) and the Maslach Burnout Inventory–Student Survey (MBI-SS). The secondary aim was to compare these results with findings in other health professions and to investigate whether there are any statistically significant differences in stress and burnout with regard to gender, age groups, working status, institutions, and academic year of chiropractic students.

METHODS

Participants

The universities of interest for this study were European chiropractic colleges with a 5-year curricular program. The following universities were contacted via email to participate in the study: Anglo-European College of Chiropractic, McTimoney College of Chiropractic, Madrid College of Chiropractic, Chiropraktik Akademie, Barcelona College of Chiropractic, Syddansk Universitet Odense, Institut Franco-Européen de Chiropraxie (Paris and Toulouse), Welsh Institute of Chiropractic, and University of Zurich.

Of these universities, 3 of them could not participate due to time constraints and other circumstances, 1 was excluded due to major differences in the chiropractic curriculum, and 1 withdrew before handing out the surveys. The remaining 4 universities participated in the study and are referred to as College 1 (C-1), College 2 (C-2), College 3 (C-3), and College 4 (C-4). This study was reviewed and approved by the Ethics Committee of Barcelona College of Chiropractic.

The Questionnaires

The instruments used to establish the prevalence of stress and burnout consisted of the MBI-SS and the PSS-10. Both questionnaires were submitted in English and students were asked several demographic questions in regard to gender, age range, working status, college, and academic year.

Maslach Burnout Inventory – Student Survey

The MBI-SS is a questionnaire specifically designed to assess burnout in college students. It takes approximately 10 minutes to complete and looks at 3 core aspects of burnout: exhaustion, cynicism, and lack of academic efficacy.[11] There are 16 questions, which are scored on a 8-point Likert scale ranging from 0 ("never") to 7 ("every day").[11,12]

The psychometric properties of the MBI-SS have been researched in the last years, demonstrating adequate internal consistency in Dutch, Spanish, Portuguese, Brazilian, and Chinese samples, with Cronbach αvalues over 0.70 for all subscales.[13–15] Nevertheless, it is important to mention that in recent literature, one of the cynicism items ("When I'm in class or I'm studying I don't want to be bothered") tends to be removed because it is considered ambivalent.[14] However, this study uses and refers to the MBI manual as a guideline and includes all original 16 items of the questionnaire.[11]

The method chosen for statistical analysis was method 2 (according to MBI manual guidelines), where an average can be extracted from each subscale of the MBI. The results of each subscale cannot be added to create a total burnout score; they are calculated and interpreted separately. Taken together, the subscales of the MBI-SS provide a 3-dimensional perspective on burnout where high scores on exhaustion and cynicism demonstrate high degrees of burnout and low scores on academic efficacy (inverse relationship) and also establishes a higher degree of burnout.[11,16] The total score of "low," "medium," or "high" burnout is categorized according to the lower, medium, and upper quartiles of the score distribution.[12,17]

Perceived Stress Scale

The PSS is a questionnaire composed of 10 items that assesses the perception of stress. It is a 5-point Likert scale where the occurrence of stress is rated from 0 ("never") to 4 ("very often").[1,18] The psychometric properties of the PSS have been validated in numerous studies, with values above 0.70 for Cronbach α, indicating adequate internal consistency.

The total scores are obtained by adding the values of each question; the scores are reversed for questions 4, 5, 7, and 8. Results can range from 0 to 40, where a higher score means a higher perceived stress.[1,18] According to Kizhakkeveettil et al,[2] PSS scores of 0 to 10 indicate low stress, 11–15 indicate mild stress, 15–20 indicate moderate stress, and above 20 indicate severe stress.

Delivery of Questionnaires

The organization Mind Garden (Mind Garden, Inc, Menlo Park, CA) was contacted to purchase electronic copies of the MBI-SS survey, while the PSS survey[19] was administered through Google Forms. Participants of the study were sent an email with links to the 2 self-reported surveys (PSS and MBI-SS) along with a portable document format version of informed consent where the study was described in detail, as was the terms of engagement. Participation was voluntary and there was no monetary compensation.

The surveys were sent out in midsemester period (November 2017) to ensure that data collection would not fall during examination periods, which could alter the results of perceived stress and burnout. The surveys

Table 1 - Demographic Characteristics of Maslach Burnout Inventory Student-Survey (MBI-SS) and Perceived Stress Scale (PSS) Respondents

	MBI-SS		PSS	
Variable	***n***	**%**	***n***	**%**
Gender				
Male	46	38.0	53	38.1
Female	75	62.0	86	61.9
Age range				
18–24	62	51.2	71	51.1
25–34	38	31.4	43	30.9
35–44	13	10.7	16	11.5
45–54	6	5.0	7	5.0
55–64	2	1.7	2	1.4
Working status				
Working	63	52.1	72	51.8
Not working	58	47.9	67	48.2
College				
C-1	54	44.6	63	45.3
C-2	34	28.1	38	27.3
C-3	18	14.9	20	14.4
C-4	15	12.4	18	12.9
Academic year				
1st	25	20.7	27	19.4
2nd	20	16.5	25	18.0
3rd	19	15.7	20	14.4
4th	26	21.5	32	23.0
5th	31	25.6	35	25.2

remained open to students during a time period of 2 weeks; multiple reminders were sent before closing access.

Inclusion Criteria

The subjects of study were chiropractic students enrolled in a 5-year academic program. The requisites were that they had to be over the age of 18, they understood and spoke English, and that they had previously read the informed consent and agreed to the terms of this study. Students who did not meet the inclusion criteria were automatically discarded from participation of this study.

Data Analysis

Data were analyzed with software (Statistical Package of Social Sciences [SPSS] Version 23.0; IBM Corp. Armonk, NY) and Microsoft Excel (Microsoft Corp, Redmond, WA). SPSS was used for reliability statistics (Cronbach α) to establish internal consistency of the MBI-SS. Descriptive statistics (mean and standard deviation) and frequency distributions of data were obtained for both surveys. Normality tests were performed using the Shapiro-Wilk test; the scores from the MBI-SS and PSS were normally distributed, hence a t test and 1-way analysis of variance (ANOVA) were used to test for statistically significant differences along with the post-hoc Bonferroni test. The Pearson's correlation test was performed to measure the strength of correlation between MBI-SS subscales.

RESULTS

Females had a higher participation rate than males (Table 1). Most responses came from students between the ages of 18 and 25 years. The percentage of responses coming from working versus nonworking students were similar.

Questionnaire Results MBI-SS

In total, 121 students participated, giving an overall response rate of 30%. C-1 had a response rate of 38%, C-2 16%, C-3 41%, and C-4 25%. Internal consistencies (Cronbach α) of the 3 subscales were as follows: 0.85 for exhaustion, 0.77 for cynicism, and 0.73 for academic efficacy.

The mean scores and standard deviations in the general student sample were 2.03 (1.31) for exhaustion, 1.44 (1.15) for cynicism, and 4.01 (1.05) for academic efficacy (Table 2). When looking at the upper quartiles for each subscale, 26.4% of students presented high emotional exhaustion, 18.2% high cynicism, and 43.8% low academic efficacy.

In the 1-way ANOVA, no statistically significant differences were found in any demographic variable except for exhaustion scores of C-3 compared to other colleges, with a p value of .001 (Fig. 1). Although not statistically significant, C-1 demonstrated higher cynicism levels and decreased academic efficacy (Fig. 1).

The Pearson correlation test showed a positive moderate correlation of ($r = 0.4$) between the subscale of cynicism and exhaustion, indicating that higher scores of exhaustion impacted and influenced scores of cynicism. This was not the case for the subscale of academic efficacy, which works in an inverse manner.

PSS

For the PSS, there was a response rate of 34%. C-1 had a response rate of 44%, C-2 46%, C-3 17%, and C-4 30%. The mean PSS score of the student population was 17.27 (7.29) out of 40, indicating moderate stress (Table 2). Similar to the MBI-SS data, there were no statistically significant differences except between chiropractic colleges, with a p value of .012. As can be seen in Table 2, C-3 demonstrated the greatest perceived stress, with an average score of 21.5 (8.18) out of 40, followed by C-1 with 17.6 (6.9). Figure 1 shows the different results of the MBI-SS and PSS by college and academic year.

As can be seen in Table 3, chiropractic students present MBI subscale results similar to those of medical students, with high levels of emotional exhaustion and depersonalization/cynicism. At the same time, interestingly, they present lower scores for academic efficacy/personal accomplishment.

In relation to PSS scores (Table 4), chiropractic students have an increased perception of stress compared to the general population and present somewhat higher scores than physical therapy and pharmaceutical students, although this difference is small.

Table 2 - Mean Scores (SD) of Maslach Burnout Inventory Student-Survey (MBI-SS) and Perceived Stress Scale (PSS)

			MBI-SS					
	PSS**		Exhaustion*		Cynicism		Efficacy	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender								
Male	15.77	7.57	1.85	1.48	1.54	1.19	3.90	1.16
Female	18.2	6.99	2.13	1.19	1.38	1.14	4.08	0.97
Age range								
18–24	17.45	6.58	2.12	1.22	1.23	0.84	4.12	1.03
25–34	17.4	7.86	1.94	1.35	1.56	1.46	3.71	1.03
35–44	15.25	8.11	2.02	1.28	1.88	1.37	4.20	0.91
45–54	19.29	9.66	1.17	1.15	1.83	1.28	4.65	0.96
55–64	17.5	7.78	3.50	3.54	1.70	0.71	3.25	2.19
Working status								
Working	16.46	7.54	1.99	1.33	1.40	1.23	3.97	1.05
Not working	18.03	6.98	2.07	1.30	1.48	1.07	4.07	1.05
College								
C-1	17.6	6.9	2.25	1.25	1.69	1.25	3.82	1.02
C-2	15.24	6.76	1.81	1.29	1.20	1.03	4.35	1.01
C-3	21.5	8.18	2.61	1.43	1.60	0.96	3.97	1.11
C-4	15.72	7.1	1.0	0.69	0.92	1.08	4.01	1.05
Total	17.27	7.29	2.03	1.31	1.44	1.15	4.01	1.05

* MBI-SS subscale of exhaustion was statistically significant with a *p* value of .001 for differences in mean between chiropractic colleges.
** PSS data were statistically significant with a *p* value of .012 for differences in mean between chiropractic colleges.

DISCUSSION

Principal Findings

Although there are a few studies that have researched stress in chiropractic students, to the authors' knowledge this is the first study to establish the prevalence of stress and burnout among chiropractic colleges with a validated and recognized psychometric tool such as the MBI. The MBI results demonstrate that 26.4% of chiropractic students present high levels of emotional exhaustion, 18.2% score high on cynicism, and 43.8% are low on academic efficacy. Meanwhile, the PSS score was 17.29 (7.29), indicating "moderate stress."[2]

We believe that this is the only study that has used the MBI-SS on a chiropractic student population, and as such, there is no comparative data in the field of chiropractic. However, when comparing MBI data to literature from other health professions (Tables 3 and 4), it is interesting to note that chiropractic students present burnout scores similar to those of medical, physical therapy, and pharmacy students.[1,2,8,11,16,20,22–25,28,29] When compared to the normative data of the Spanish reference population, chiropractic students revealed higher levels of exhaustion and lower levels of academic efficacy (data provided by burnout measures of the Spanish Ministry of Labor and Social Affairs as set by Bresó et al).[12,30,31] When comparing PSS data to that of the general population, chiropractic students also obtained higher results.[27,32] However, the PSS scores in the study by Bamuhair et al[1] showed that medical students presented a total PSS score of 32.3 (4.1), which is far above the mean score of chiropractic students and is considered to be "severe stress." This finding is incongruent with the MBI-SS data where chiropractic students presented burnout levels similar to those of medical students. The reason remains unclear, and further

Table 3 - Comparison of Maslach Burnout Inventory Student-Survey (MBI-SS) High Subscale Results Between Chiropractic Students and Medical Students

Students	Reference	Emotional Exhaustion, %	Depersonalization/ Cynicism, %	Personal Accomplishment/ Efficacy, %
Chiropractic	Perelló et al [a]	26.4	18.2	43.8
Medicine	Guthrie et al[16]	10.4	5.9	15.1
	Willcock et al[20]	14.0	21.0	25.0
	Dyrbye et al[21]	37.0	27.4	43.2
	Santen et al[22]	32.8	32.8	39.5
	Galán et al[12]	20.7	17.0	18.4

[a] Perelló et al (present study) uses the following burnout criteria: high scores on emotional exhaustion and cynicism; low scores on academic efficacy subscale.

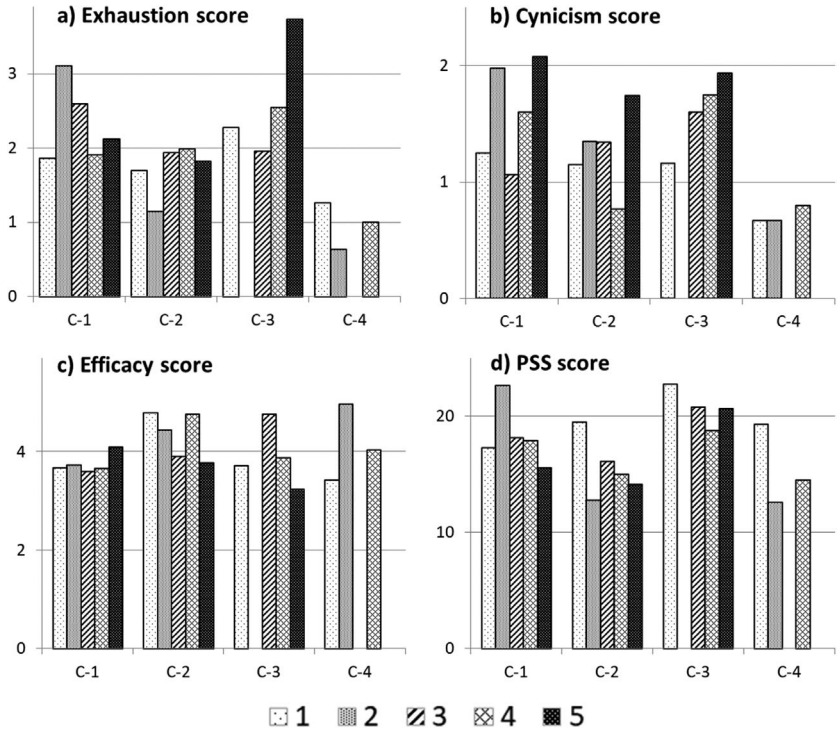

Figure 1 - Maslach Burnout Inventory Student-Survey (MBI-SS) and Perceived Stress Scale (PSS) by college and academic year. Academic years with 3 or fewer respondents were excluded in this figure.

comparative studies between a chiropractic student population and a medical student population would be beneficial to understand the differences.

There are several hypotheses for why chiropractic students may present levels of burnout similar to medical students. First, the chiropractic curriculum is academically and physically demanding. Many students report considerable musculoskeletal injuries from delivering and receiving large numbers of spinal adjustments in technique classes, especially of the lumbar spine.[8] The strain that is put on the students' bodies could be an additional factor for the increased perception of stress and burnout.

Looking closer at the differences between chiropractic institutions, both surveys revealed statistically significant differences of stress and burnout between colleges, but they were negative for other demographic variables such as age, gender, academic year, and working status. The MBI-SS showed a p value of .001 for the subscale of exhaustion, while the PSS gave a p value of .012 between the different institutions. In both surveys, the post-hoc Bonferroni test was significant for C-3 in relation to the other chiropractic colleges. When analyzing results of the MBI-SS, C-3 ranked highest in exhaustion while C-1 demonstrated higher results for cynicism and the lowest scores for academic efficacy. This same tendency was observed with the PSS. It would be interesting for this college to look into the possible causes that accounted for such statistically significant differences in comparison to the other chiropractic colleges.

Table 4 - Average Levels of Stress in Different Student Populations Measured Using Perceived Stress Scale (PSS) 10

Students	Reference	Mean (SD)
Chiropractic	Perelló et al [a]	17.3 (7.3)
	Kizhakkeveettil et al[2]	18.8 (5.4)
	Innes et al[8]	19.5 (6.6)
MD	Rahimi et al[23]	16.0 (6.0)
	Bamuhair[1]	32.3 (4.1)
Pharmacy	Beall et al[24]	17.9 (6.5)
Physical therapy	Jacob et al[25]	13.6 (ND)
General population	Cohen et al[26]	15.8 (7.5)
	Statistics Canada[27]	12.9 (6.3)

All values are expressed as the mean (standard deviation). ND: not determined.

[a] Perello et al is the present study.

Meanwhile, a plausible reason for elevated scores of stress and burnout in the case of C-1 and C-2 is that both are young and recently accredited institutions. As such they are still adapting and improving their academic curriculum to meet European standards. Although not statistically significant, other aspects worthy of mentioning are that females presented higher values of stress and burnout than their male counterparts. Furthermore, employed students presented lower levels of perceived stress and burnout than those solely engaged in academics.

In the Innes et al[8] study, it was observed that the stress levels were not statistically significant across the different academic years, which is similar to the findings in this study. It is noteworthy to mention that most chiropractic colleges have different entries into clinical years, which could therefore be an explanation as to why there are no

common peaks of stress in academic years between institutions. Bamuhair et al[1] also found that the age of participants was not significantly associated with scores of the PSS, which is similar to the results in this study. Nonetheless, it is interesting to mention that in this study, there were several students above the age of 54 who presented higher stress and burnout levels than younger-aged students (most likely due to family and work-related factors), but since they represent 5% of the total student population, their results do not weigh heavily enough to contribute to a statistically significant difference.

With regard to gender differences, scientific literature commonly finds females to present higher stress and fatigue scores than do their male counterparts.[1,2,8] As mentioned earlier, this phenomenon was also noted in this study, although it did not come out as statistically significant. Bamuhair et al[1] suggest that females may have more stressors in their lives, but that they also use more coping strategies.

According to Fares et al,[33] burnout varies significantly between different countries and can be attributed to varying life stressors from every region. It would be interesting to identify the main sources of stress as Bamuhair et al[1] did for medical students. Her study concluded that the main stressors were as follows: "study in general, worrying about the future, interpersonal conflicts and low self-esteem." It is feasible to suggest that chiropractic students may have similar stressors, but it is an area worthy of investigation.

With regard to coping mechanisms, Kizhakkeveettil et al[2] found that chiropractic students tend to use wellness strategies, social support systems, and chiropractic treatment as methods to combat stress and fatigue. The research revealed that the most common coping mechanisms of chiropractic students to address stress was exercise, sleep, talking to friends, listening to music, and chiropractic treatments. In regard to combating fatigue, students used rest, chiropractic treatment, supplements, and massage.[2] Another study made reference to the development of the first chiropractic Student Support Center, which helped students deal with significant psychological strain as most students were "juggling" their time between rigorous academic work, employment, and family.[3,4] These findings are interesting to consider, especially in the case of applying systems to aid students to build a social network of support and improve resilience levels.

Implications

The significance of these results is that they are in line with recent literature identifying a growing trend of students in the health professions who suffer from moderate to high levels of stress and burnout. Although not conclusive, this study presents the first results from a validated psychometric tool such as the MBI and demonstrates that chiropractic students present considerable amounts of exhaustion, cynicism, and lack of academic efficacy, similar to the level found in medical students. The importance of this study is that it establishes a prevalence of burnout in the field of chiropractic and also points to colleges that suffer higher degrees of stress and burnout. Examining the scope of stress and burnout is necessary to aid in the future development of curriculums in order to reduce the burden on students and prevent them from suffering burnout by the time they get into practice. Future studies should place their efforts on establishing the sources of stress and coping mechanisms so that colleges can improve the quality of life of students and help build more resilience.[7,8,28]

Limitations

This study had several limitations. First, the study is cross-sectional and cannot determine causal relationships. Furthermore, the answers to the surveys are subject to recall and reporting bias. The response rate to this study was also fairly low and can be partly explained by the fact that it was an electronically administered survey. According to Nulty,[34] the overall response rate of online administered surveys is 32.6%. In this study, the response rate ranged between 30% and 34%. However, these numbers may not be representative of the chiropractic student population due to the small European student sample. Another question to consider is whether the individuals who participated did so because they were the most affected by stress and burnout and felt inclined to respond to a situation that pertained to them, or whether the responses truly come from a representative sample of students. In either case, an increased number of participants is necessary to obtain more conclusive findings in the field of chiropractic.

Another limitation is that only a fraction of European chiropractic institutions participated, and hence the results lack representation of student populations from other countries. It is also important to mention that the academic year where interns enter clinical facilities differ from college to college and can therefore affect the results of stress levels between academic years. Furthermore, a large majority of responses came from 1 college only and can therefore affect the representability of results. A longitudinal study following the students over the length of program should be considered for future studies, as well as determining the sources of stress and coping mechanisms.

In relation to the MBI-SS, there have been numerous difficulties. First, although the MBI remains the gold standard for measuring burnout, there is considerable variability on how researchers define and assess burnout scores, especially as it is composed of 3 subscales that cannot be combined. Some studies have combined the subscales to provide a single measure of burnout; we chose to respect the individual measures for burnout.

CONCLUSION

This study established the prevalence of stress and burnout in the chiropractic student population with validated psychometric tools such as the MBI and PSS, with 26.4% of students presenting high emotional exhaustion, 18.2% high cynicism, and 43.8% low academic efficacy, while obtaining "moderate" scores for perceived stress. It was also found that stress and burnout levels in

chiropractic students are similar to those of medical students. When comparing the different colleges, C-3 presented the highest values for exhaustion and perceived stress while C-1 demonstrated the lowest academic efficacy and highest cynicism levels. There are also differences in working status and gender, although these findings are not statistically significant. Females present higher values than males, while surprisingly, employed students have reduced amounts of stress and burnout in comparison to non-working students. Future studies with a wider participation should be performed to obtain reliable results in order to properly represent stress and burnout in the field of chiropractic. Further efforts in investigation should also focus on discovering the sources of stress as well as the most effective coping mechanisms in order to improve quality of life and resilience in chiropractic students.

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Author Contributions

Concept development: MP. Design: MP. Supervision: PP. Data collection/processing: MP. Analysis/interpretation: MP, PP. Literature search: MP. Writing: MP. Critical review: MP, PP.

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